THE OIL EXPORT-IMPORT POLICY OF THE UNITED STATES

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OF THE
UNITED STATES

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FOREWORD

This paper has been prepared as a review of the recent trends of the oil export-import policy of the United States, with particular regard to the years since this country became a net oil importer.

The author wishes to express his appreciation to Professor Holbrook C. Bobst, Head of the Petroleum Engineering Department, University of Pittsburgh, for his helpful suggestions in the preparation of this thesis.

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I. INTRODUCTION

The oil export-import policy of the United States is influenced by many factors and is, of necessity, subject to constant appraisal and change. It is a highly controversial issue which cuts across all phases of the industry's operations both here and abroad and it has social and political implications as well as economic and defense considerations.

In order to establish what might be considered a broad overall policy, certain known factors, available from past records, must be considered and, in light of past performances, intelligent estimates of future requirements must be made.

It is an oft repeated statement that the economy of this country is geared to the petroleum industry. In peacetime we are a nation on wheels and wings in the pursuit of business, industry and pleasure. The demand for petroleum fuel for these purposes is ever increasing.

In wartime the amount of petroleum necessary to give our armed forces the mobility requisite to the successful prosecution of a war increases tremendously. The domestic demand also increases, with most of the consumption tied directly to the military effort. As a result there is a drastic reduction in the amount available for recreation or convenience.

In this discussion consideration will be given to past production in times of war and peace; estimates of reserves; estimates of future requirements.

It would seem that any estimates of future requirements should

take into consideration three conditions:

a. peacetime

b. limited emergencies such as the current Korean War

c. all out war

A backward glance must also be given to the effect of such unpredictable events as the nationalization of the Iranian oil industry.

A discussion of sources of liquid fuels, other than crude petroleum, is also pertinent.

The ability of the oil industry to meet future demands through increased discoveries, which in turn affects our ability to export or need to import, is also dependent upon the vagaries of Congress in respect to such things as: depletion allowances, taxation, import duties, and cognizance of tidelund oil provinces.

The petroleum industry has the responsibility of improving recovery techniques, both primary and secondary, and of refining methods. The sincerity of the industry in these respects is unquestioned and it can be expected that progress will continue to be made if the atmosphere of free enterprise prevails.

II. [illegible] SOURCES OF SUPPLY

A. Proved Reserves of the United States

The proved reserves of petroleum liquids as estimated by the American Petroleum Institute as of January 1, 1961, were as follows:[1]

Million Barrels

Crude Oil	Natural Gas Liquids	All Hydrocarbon Liquids
29268.4	4267.7	33536.1

The average daily production of U. S. crude in 1961 was 6,149,100 barrels, and the predicted average daily production for 1962 was 6,330,100 barrels.[2]

Table I, Appendix, shows estimates of proven reserves, annual production and ratio of reserves to production for the years 1939 through 1961.

The ratios of reserves to production for the postwar years were:

1946 - 11.8
1947 - 11.5
1948 - 10.7
1949 - 12.3
1950 - 12.7
1951 - 11.4

These figures indicate no definite upward or downward trend. The maximum deviation from the average is 1.05, being plus 1.05 in 1949 and minus 1.05 in 1948.

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1 Petroleum Productive Capacity, National Petroleum Council, 1962, p.22.

2 World Oil, February 15, 1962, p. 172.

The World Oil estimate of crude reserves proved during 1951 is 3,284,241,000 barrels giving a net increase in reserves of 1,040,212,000 barrels, resulting in a year-end ratio of 11.0.

The steady increase in the estimates of proven reserves since the end of World War II may be attributable to two factors: greater ultimate recovery from already producing fields because of improved techniques, and to new discoveries.

Although it is admittedly increasingly more difficult and costly to find new oil, the fact remains that it is being found.

2. Foreign Sources of Supply

The two major producing areas outside North America from which the United States may import crude to supplement its own production are South American and the Middle East. These sources are dependable enough in peacetime but in the event of a war with a power having a sizeable submarine arm they must be considered to be shaky in the extreme. In the event of such a war the Middle East source would undoubtedly be abandoned completely. In line with the principle of Western Hemisphere defense, there would, no doubt, be a determined effort made to keep open the supply routes to South America. With our improved methods of anti-submarine warfare there is little doubt that these sea lanes could be kept open but losses would be inevitable.

Estimates of crude reserves and production figures for the areas of most direct interest to the United States are given below:[1]

Area	Estimated Reserves January 1, 1952 Thousand Barrels	Production 1951 Thousand Barrels
South America		
Venezuela	10,000,000	652,208
Colombia	400,000	35,026
Middle East (Exclusive of Iran)	55,025,000	809,012

The important foreign sources of crude petroleum in North America are Canada and Mexico.

The estimates of proved reserves in Mexico as of January, 1952, were 1,378,000,000 barrels. Her production for 1951 was 76,267,000 barrels.[2]

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1 World Oil, February 15, 1952, p. 261.
2 Ibid.

The most encouraging development as regards the supplementing of our petroleum supplies without recourse to overseas transport has been expansion of the Canadian oil industry following the discovery at Leduc, Province of Alberta, in 1947.

At the end of 1951 Western Canada was producing 166,000 barrels per day, or approximately 40 percent of the Canadian domestic requirements. In 1946 Canada was importing 90 percent of her petroleum from the United States and the Caribbean area.

The proved crude reserves of Canada are now over 1.5 billion barrels. Conservative estimates place potential reserves at more than 8 billion barrels with the optimistic estimators placing them as high as 15 or 20 billion barrels.[1]

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1 World Oil, June, 1952, p. 58.

III. SYNTHESIS OF LIQUID FUELS OTHER THAN NATURAL CRUDE

The principal prospective sources of petroleum fuel which might be utilized to supplement our natural crude resources are as follows:

a. Conversion from natural gas

b. Conversion from coal

c. Recovery from oil shales

d. Recovery from tar sands

Agricultural products and agricultural waste are potential sources of substitutes for petroleum fuels; however, the limitations are such that they are not now and probably will not be given serious consideration. The product, alcohol, is relatively expensive and is probably more important to the chemical industry.

There has been a rather sharp difference of opinion between the petroleum industry and the government agencies interested in petroleum problems in respect to the development of synthetic fuels.

At the annual meeting of the American Petroleum Institute in Chicago in November, 1951, the Secretary of the Interior urged the advance in development of synthetic fuels. He expressed the intention of his department to proceed with the construction of plants for the production of liquid fuel from coal and oil shale if provided with the funds which had been requested.[1]

At the same meeting an opposite view was expressed by the representatives of industry. Mr. Frank L. Porter, president of the American

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1 Oil and Gas Journal, November 12, 1951.

Petroleum Institute, was of the opinion that we could not, at this time, afford the luxury of wasting materials and manpower on such an extensive project. He stated that if it were to be undertaken by industry, future exploration for oil would be retarded.

Mr. Eugene Holman, president of the Standard Oil Company of New Jersey, took the position that the processes involved in the production of synthetics were well known and that for the present, effort should be confined to the laboratory and the pilot plant; that normal economic indicators would point the time for expansion.

A. Conversion from Natural Gas

Hydrocol Process. The Hydrocol process is an American modification of the Fischer-Tropsch process of hydrocarbon synthesis. Natural gas instead of synthetic water gas is used as the raw material.

Another major difference between this and the original Fischer-Tropsch process is the use of the American fluid type of catalyst instead of the German pellet catalyst. This has reduced the number of reactor chambers from 120 in the German plant to four in an American plant of the same capacity.

With an input of 84 million cubic feet of natural gas and 220 million cubic feet of air, the yield is 8000 barrels of gasoline, 1200 barrels of Diesel oil, and approximately 600 barrels of crude alcohol.[1]

One commercial plant with a capacity of about 7000 barrels of gasoline per day has been built at Brownsville, Texas.

If all the known natural gas in the United States were to be converted into liquid hydrocarbon, the eventual yield would be about 12 billion barrels.[2]

The wisdom of considering natural gas as a potential addition to our liquid hydrocarbon reserves is doubtful, however, since gas is a fuel which is very much in demand in its own right.

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1 Keith, F. C. "Gasoline from Natural Gas," Oil and Gas Journal, June 15, 1946, p. 107.
2 Lucian, K. K. "Petroleum Geology," 1951, p. 626.

B. Conversion from Coal

Coal Hydrogenation Process. This process was developed in 1910 by a German, Friedrich Bergius. The process was not commercially feasible until 1927 when I. G. Farbenindustrie developed catalysts which would speed it up.

The process consists of the hydrogenation of an oil slurry of pulverized coal under high pressure (3000 to 10,000 psi) and temperature (800°F.), in the presence of a catalyst. The oil produced is fractionated into three cuts. The light fraction is refined to gasoline. The medium fraction is re-cycled for further hydrogenation, and the heavy fraction is used to mix the oil-coal slurry.

The coal reserves of the United States could be used to make several hundred billion barrels of liquid fuels.[1] The cost, however, would be prohibitive.

Fischer-Tropsch Process. This process was first announced in Germany, in 1926, by Franz Fischer and Hans Tropsch. It was put into commercial operation in 1935.

The original process consisted of producing water gas in the usual manner from coke and steam which was then passed through catalyst chambers. The gas was synthesized into hydrocarbons called kogasin. The final step was a normal refining process.

A significant advance in the process was that gas produced from sub-bituminous coal and lignite could be used.

There is little demand for sub-bituminous coal and lignite

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1 "Petroleum Productive Capacity," National Petroleum Council, 1962, p. 61.

and there are large deposits of both available for economical strip mining in this country. This is probably the most promising source of synthetic fuels which this country has.

Coal Carbonization. This process is simple distillation carried out at either high or low temperature. The products consist of a relatively small quantity of liquid fuel and a very large quantity of of coke. The yield of gasoline is about one sixth of that produced by the hydrogenation process.

This process is not considered to be of any commercial importance.

C. Recovery from Oil Shales

The term "oil shale" covers a wide variety of laminated clayliike or sandy deposits which have the common property of yielding oil when heated to relatively high temperatures. They are only slightly, if at all, susceptible to the extraction of oil by the action of solvents at atmospheric temperatures. The oil-yielding material in oil shale consists of organic substances called "kerogen."

Oil shale deposits of varying kerogen content are present in the United States. The greatest area covered by these shales is in Wyoming. However, those of special interest because of their richness are the reserves in the Rifle-Debeque area of western Colorado. These reserves have been estimated to contain a potential of 300 billion barrels of oil.[1]

In France and Scotland, oil has been produced commercially from oil shale for about 100 years.

In 1944 Congress authorized[2] the design, construction and operation of demonstration plants to produce synthetic liquid fuels from coal, oil shales, agricultural and forestry products, and other substances.

With this authority the U. S. Bureau of Mines has constructed a demonstration plant near Rifle, Colorado. The installation includes two N-T-U (Nevada-Utah-Toma) batch type retorts, each capable of holding 40 tons of raw oil shale.[3]

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1 Landes, K. K., "Petroleum Geology," 1951, p. 229.
2 Public Law 290
3 W. E. Robbins, "A Brief Review of Developments in the Exploitation of Oil Shale," U. S. Naval Engineering Experiment Station Report, 1950, p. 4.

The operation of a retort consists of starting a fire at the top of the shale bed and supplying air for combustion, together with hot re-cycle gas, up through the shale, distilling oil ahead of it, and burning the non-condensed gases and the residual carbonaceous material in the spent shale. The crude shale oil flows from the bottom of the retort and is ready for refining.

The refining facilities at this plant were put in operation in 1949 and are most complete and versatile.

D. Recovery from Tar Sands

The subject of tar sands does not belong, rightfully, in a section devoted to fuels other than those derived from natural crude petroleum, but since the process of recovery differs so greatly, it will be so considered. In tar sands a heavy oil (natural petroleum) occurs as a film surrounding sand grains.[1]

Tar sands are found in the United States in California, Utah, and Wyoming, but the most extensive deposit to be found in the Western Hemisphere (and the world) is in the Athabasca Valley of northern Alberta, Canada.[2]

Estimates of the reserve of petroleum products in the Athabasca tar sands range upward to 250 billion barrels.

In order to recover oil from the tar sands, the sands must be mined, crushed, and treated with steam, hot water, or solvents. The process is multi-stage and the product is a very sour crude which must then be refined.

The recovery of petroleum from tar sands is not economically feasible at this time.

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1 Landes, K. K., "Petroleum Geology," 1951, p. 104.
2 Ibid, p. 626.

IV. ESTIMATES OF FUTURE REQUIREMENTS

In a report to the President by the President's Materials Policy Commission (William S. Paley, Chairman), the estimate of consumption of petroleum and natural gasoline in 1975 is placed at a 100 percent increase over that of 1950, or an average daily demand for all oils of 15,000,000 barrels.[1] This assumes no relative change in prices. In the same report the estimate for 1975 consumption of natural gas is placed at a 142 percent increase over that of 1950.

The Commission recommends,[2] "That percentage depletion be retained because of its strong inducement to risk capital to enter the minerals industries but that the rates now provided in the Internal Revenue Code be raised no further."

The major premise on which the Materials Policy Commission's report was based was stated to be: "The over-all objective of a national materials policy for the United States should be to insure an adequate and dependable flow of materials at the lowest cost consistent with national security and with the welfare of friendly nations."[3]

The United States' demand for crude petroleum has outstripped domestic production within the last five years. Since the country is faced with a possible doubling of the demand by 1975, it will probably be found economical to turn increasingly to foreign oil imports. The Materials

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1 "Resources for Freedom," Vol. I, A Report to the President by the President's Materials Policy Commission, June, 1952, p. 24.
2 Ibid. p. 35.
3 "Resources for Freedom," Vol. I, p. 3.

Policy Commission also predicts that synthetic oil will come into commercial production within a decade.[1]

In a memorandum from the Deputy Administrator, Petroleum Administration for Defense, to the Secretary of the Interior, it was stated that 35,000 wells were to be drilled during the latter half of 1952, and 55,000 during 1953. It was estimated that by the end of 1953 a daily average producing capacity of 7,022,000 barrels would be attained. Of this capacity 1,110,000 barrels per day would be reserve productive capacity; about the same as that with which we entered World War II.[2]

If the above production rate is realized, it will meet the short term target of the Department of Defense which has publicly called upon the domestic petroleum industry to provide a reserve capacity within the United States equal to 15 percent of the annual consumption.[3]

The Petroleum Administration for Defense and the Department of Defense have estimated that the additional domestic oil production which would be required in the event of a full-scale war would be at least 1,000,000 barrels per day.[4]

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1 "Resources for Freedom," Vol. I, p. 107.

2 Testimony in a Hearing before the Committee on the Judiciary, U. S. Senate, 82nd Congress, June 12, 1952, p. 6.

3 "Resources for Freedom," Vol. III, p. 10.

4 "The Third World Petroleum Congress," A Report to the Select Committee on Small Business, U. S. Senate, and the Select Committee on Small Business, U. S. House of Representatives, 82nd Congress, December 29, 1951, p. 5.

V. REVIEW OF IMPORTS AND EXPORTS OF OIL.

Tables 2 and 3 of the Appendix list, respectively, the imports and exports of oil by the United States for the years 1920 through 1951. These tables show that the United States was a net exporter of petroleum and petroleum products up to and including 1947. Since 1948 this country has been a net importer. The amount of net imports rose to a peak in 1950 and dropped in 1951. Total daily average imports in 1951 were 961,000 barrels as compared to 867,000 in 1950. Total daily average exports in 1951 were 457,200 barrels, while in 1950 they were 504,200.

Imports to Europe in 1951 were stimulated by the shutdown of the Abadan refinery in Iran. Imports were also affected by the Iranian situation, in that Caribbean and Middle East oil which would normally have come to the United States was diverted to Europe.

The sharp increase in production in other parts of the Middle East is expected to overcome the loss of Iranian oil and to insure adequate supplies for the European refineries this year.

The former United States imports-export trend is expected to be restored in 1952, and the net importation will probably reach an all-time high.[1]

Over the years the largest percentage of imported petroleum has been in the form of crude. However, the total percentage of imported crude has declined from more than 90 percent to about 80 percent. In

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1 World Oil, February 15, 1952

May, 1958, crude oil represented 84.7 percent of the total volume imported.[1]

The increased percentage of refined products imported during early 1958 was made necessary because of the loss in domestic production occasioned by the refinery strikes.

The tariff rate on crude oil, topped crude and fuel oil is 10.5 cents a barrel on an annual quota of permissible imports equal to 5 percent of the domestic crude run to stills during the previous year. The tariff on imports over and above this quota is 21 cents per barrel. The permissible import quota, at the reduced rate, for 1958 is 110,700,000 barrels. This quota is prorated among the various producing countries. The 1958 quotas are:[2]

Venezuela	70,000,000 barrels
The Netherland and its Territories	22,000,000 barrels
All Other Countries	18,000,000 barrels

The National Petroleum Council has recommended that petroleum imports should be such that they supplement but do not supplant domestic petroleum supplies.[3] The difficulty lies in determining when imports cease to supplement and start to supplant.

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1 Current Outlook Section, World Oil, June, 1958, p. 46.
2 World Oil, February 1, 1958, p. 32.
3 "A National Oil Policy for the United States," The National Petroleum Council, p. 10.

VI. [illegible] ASPECTS OF THE [illegible] OF PETROLEUM

There is a delicate state of balance within the petroleum industry and the import policy must be such that that balance is maintained and that the economic stability and virility of the industry will not be impaired. The policy of the National Petroleum Council that imports should "supplement but not supplant" our domestic production appears to be sound.

Over importation would, undoubtedly, reduce the price of domestic crude. Exploration would probably be curtailed with a resultant reduction in proved reserves since the withdrawal of presently produced fields would not be matched by new discoveries.

On the other hand, the energy economy of this country has prospered on the basis of using the cheapest available fuel. It is conceivable that it would continue to prosper if our oil consumers are allowed to have access to the lowest cost sources consistent with national security. United States production is expected to continue to grow but the consumption is expected to increase even more rapidly than production. It would thus appear that there is a possibility of increasing imports while still maintaining a healthy domestic petroleum industry.

The following is quoted from the progress report of the Committee on Interstate and Foreign Commerce of the 81st Congress:[1]

"How far will pressures for the disposal of overseas production

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1 Progress Report of the Committee on Interstate and Foreign Commerce, 81st Congress, House Report Number 2035, May 15, 1950, p. 2.

within the U. S. result in imports which significantly supplant rather than supplement domestic production?

The uncertain foreign market for foreign-produced oil has led to the expressions of fear that unless that problem is solved, American companies will be forced to sell more in the U. S."

VIII. CONCLUSIONS

A. The rate of increase of domestic demand for petroleum will exceed the increase in rate of production during the foreseeable future. The United States will, therefore, continue to be a net importer of oil.

B. Domestic oil should be produced at the maximum efficient rate of recovery with the deficit in demand met by imports.

C. The import situation must be kept under constant surveillance by such agencies as the Petroleum Administration for Defense and the National Petroleum Council, for the purpose of determining when a change in policy is necessary to prevent imports from passing beyond the stage when they cease to supplement, and begin to supplant, domestic production.

D. The domestic industry should be protected by a tariff on imported crudes. The tariff should be such that the price of foreign crudes is slightly in excess of that of domestic crude. In this way the incentive and ability to continue intensive domestic exploration will be maintained.

E. In the event of war the only dependable source of petroleum is that which does not involve overseas transport. At the present time the brightest part of the nation defense picture is the rapidly expanding Canadian oil industry.

F. As long as imports from overseas sources are required to fill our demands those from South America should continue to receive preferential treatment. The supply lines are relatively short and can

be more readily defended than those to any other overseas source. The American oil industry has the dominant interest there.

6. The time will undoubtedly come when it will be necessary to turn to synthetic fuels as a supplement to those produced from petroleum. The government should continue to give active support to research projects in synthetics. When methods are perfected whereby synthetic fuels can compete economically with petroleum fuels, or if a national emergency forces their use, the oil industry will, unquestionably, contribute its full weight to their production.

APPENDIX

APPENDIX

Table I

Crude Oil Reserves and Production
in the United States
1929 - 1952[1]

YEAR	PROVED RESERVES AS OF JANUARY 1 MILLION BARRELS	ANNUAL PRODUCTION MILLION BARRELS	RATIO OF RESERVES TO PRODUCTION
1929	11,000.0	1,007.5	11.0
1930	13,300.0	898.0	14.8
1931	13,000.0	851.1	15.0
1932	13,000.0	785.2	16.6
1933	12,300.0	905.7	13.6
1934	12,000.0	906.1	13.2
1935	12,177.0	996.6	12.2
1936	12,400.0	1,099.7	12.4
1937	13,065.4	1,279.2	10.2
1938	15,807.3	1,214.4	12.8
1939	17,348.1	1,264.9	13.9
1940	18,485.0	1,353.2	13.6
1941	19,024.5	1,402.2	13.6
1942	19,838.5	1,336.6	14.1
1943	20,982.0	1,505.6	13.9
1944	20,904.2	1,677.9	11.9
1945	20,655.2	1,713.6	11.9
1946	19,941.8	1,726.3	11.6
1947	20,875.6	1,860.4	11.2
1948	21,487.7	2,002.4	10.7
1949	23,295.4	1,818.8	12.8
1950	24,059.8	1,963.8	12.2
1951	25,350.4	2,214.0	11.4

1 American Petroleum Institute figures except for 1948-1951 which are from World Oil, February 15, 1952, pp. 172, 190, 192.

APPENDIX

Table XI

United States Oil Imports
1929 - 1961[1]

YEAR	CRUDE OIL BARRELS	REFINED PRODUCTS BARRELS	TOTAL IMPORTS BARRELS
1929	76,933,000	33,777,000	109,710,000
1930	62,129,000	43,490,000	105,619,000
1931	47,220,000	38,307,000	85,527,000
1932	44,018,000	33,312,000	77,330,000
1933	31,822,400	13,301,000	45,123,400
1934	35,550,000	14,056,000	49,606,000
1935	32,230,000	20,300,000	52,530,000
1936	35,327,000	24,777,000	60,104,000
1937	37,434,000	29,678,000	67,112,000
1938	30,432,000	27,396,000	57,828,000
1939	33,006,000	25,993,000	58,999,000
1940	42,682,000	41,019,000	83,701,000
1941	50,806,000	46,336,000	97,142,000
1942	12,297,000	23,609,000	35,906,000
1943	13,855,000	49,579,000	63,434,000
1944	44,800,000	47,506,000	92,311,000
1945	74,337,000	38,232,000	113,569,000
1946	80,000,000	51,910,000	131,910,000
1947	97,823,000	41,897,000	139,720,000
1948	120,000,000	30,051,000	150,051,000
1949	153,000,000	31,373,000	184,373,000
1950	177,734,000	131,456,000	309,190,000
1951	179,425,000	127,807,000	307,232,000

1 World Oil, February 15, 1962, p. 49.

APPENDIX

Table XII

United States Oil Imports
1929 - 1961[1]

YEAR	CRUDE OIL BARRELS	REFINED PRODUCTS BARRELS	TOTAL IMPORTS BARRELS
1929	26,401,000	136,719,000	163,120,000
1930	25,705,000	152,780,000	178,485,000
1931	29,035,000	95,819,000	124,854,000
1932	27,805,000	75,068,000	102,873,000
1933	30,004,000	70,143,000	100,727,000
1934	41,127,000	73,980,000	114,107,000
1935	51,450,000	77,007,000	128,907,000
1936	60,313,000	81,021,000	141,904,000
1937	67,234,000	105,000,000	172,234,000
1938	77,256,000	116,474,000	193,730,000
1939	72,076,000	116,903,000	188,979,000
1940	51,496,000	78,970,000	130,466,000
1941	55,230,000	75,092,000	130,322,000
1942	53,894,000	65,075,000	118,969,000
1943	41,342,000	103,615,000	144,957,000
1944	34,238,000	173,378,000	207,616,000
1945	32,998,000	140,905,000	173,903,000
1946	42,436,000	110,687,000	153,123,000
1947	46,886,000	113,191,000	160,077,000
1948	59,736,000	94,958,000	154,694,000
1949	55,009,000	60,307,000	115,316,000
1950	54,706,000	76,237,000	131,035,000
1961	28,800,000	127,339,000	156,139,000

1 World Oil, February 15, 1962, p. 40.

APPENDIX

Table IV

Net Exports of Oil by the United States

1920 - 1951

YEAR	EXCESS NEED EXPORTS[1]
1920	(-) 54,610,000
1930	(-) 50,577,000
1931	(-) 30,307,000
1932	(-) 28,731,000
1933	(-) 61,432,000
1934	(-) 64,615,000
1935	(-) 70,332,000
1936	(-) 74,000,000
1937	(-) 116,677,000
1938	(-) 139,420,000
1939	(-) 139,000,000
1940	(-) 46,715,000
1941	(-) 12,000,000
1942	(-) 00,061,000
1943	(-) 00,645,000
1944	(-) 115,300,000
1945	(-) 69,304,000
1946	(-) 16,447,000
1947	(-) 5,000,000
1948	(+) 88,470,000
1949	(+) 116,185,000
1950	(+) 190,114,000
1951	(+) 181,294,000

1 Differences between totals of Table II and Table III

APPENDIX

Table V

ESTIMATE OF MILITARY REQUIREMENTS IN THE EVENT OF WAR
(Barrels Per Day)

Navy	600,000
Army Ground Forces	282,432
Air Force	1,200,000
Toluene for Explosives	13,000
For Synthetic Rubber	43,570
Total	2,219,002

These estimates were made in 1947.[1]

These estimates are based on the assumption that the requirements for the Navy, Army Ground Forces, explosives and synthetic rubber will be the same as they were at the peak of World War II.

The requirements for the Air Force are based on the assumption of 100 percent conversion to jet aircraft.

An inquiry made at the Munitions Board revealed that the latest official estimates of future military requirements are in a confidential status.

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1 Singer, Morton, "An Evaluation of the Ability of the United States to Fuel Another War," M. S. Thesis, University of Pittsburgh, 1947, p. 58.

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